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(54) **Electrical cable connector assembly.**

(57) One connector (14) comprises a conductive block (48) encased in insulating material (18) with a cylindrical recess (26) in the block. A wedge (38) projects into the recess. The other connector (12) has a conductive block with a cylindrical post (20) projecting therefrom for mating within the recess (26). The distal end of the post (20) has a flat (40) and an annular groove (34) defining a part annular ridge (36). When the post is inserted in the recess, relative rotation enters the wedge (38) into the groove (34), which has a helical flank on the ridge (36) such as to draw the connectors (12) and (14) together and compress their insulating materials (18) together to provide a seal.

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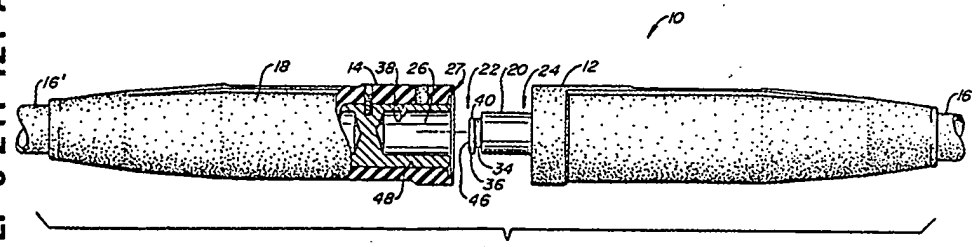

FIG_1.

ELECTRICAL CABLE CONNECTOR ASSEMBLY

This invention relates to an electrical cable connector of the kind set forth in the introductory part of claim 1.

Cable connector assemblies are known in a wide variety of applications. In many of these applications, superior electrical contact between two cables is desired in addition to a more secure engagement mechanism. Further, it is desirable that the connectors be durable so as to withstand heavy and continuous use. It is also desirable that a connector assembly be versatile so as to be useful in more than one application. Economy of manufacture is still an additional consideration. Positive engagement is a primary concern. There should also be some indication of engagement or disengagement which is visual or by "feel".

Many existing cable connector assemblies fail in one or more of these respects. For example, some prior art cable connector mechanisms do not provide for positive engagement. They also do not permit the operator to know when they are engaged or disengaged by sight or "feel" or both.

Accordingly, it is an object of the invention to provide a connector assembly which overcomes these disadvantages.

The connector assembly according to the invention is characterised in claim 1.

In one embodiment of the present invention, a cable connector assembly comprises a first cable connector having a protruding connector post at one end adapted to fit a recess in a second cable connector. When coupled, one connector may be rotated 180° about the longitudinal axis of the assembly so as to engage the connectors. In order to disengage the connectors, the 180° rotation is performed in the reverse direction. This engagement/disengagement feature is provided by an internal cam-type mechanism.

In another aspect of the present invention, the connector assembly includes external visual indicia as to its engaged or disengaged state. Each substantially cylindrical connector is provided with two opposing, differing symbols, such as a circle and a square, at the mating end thereof. Thus, when the connectors are mated but disengaged, a circle will be adjacent a circle and a square adjacent a square; correspondingly, when engaged (i.e. after 180° twist), each circle will be adjacent each square, since the symbols are on diametrically opposing sides of the connector.

Optionally, the connector post on the first connector may be provided with an asymmetric longitudinal groove extending through the post in order to reduce wear and ensure a more secure fit.

Brief Description of the Drawings

Figure 1 is a side elevation, partially cross-sectional view of the connectors of the instant invention prior to coupling;

Figure 2 is a side elevation view of the connector assembly made up of the connectors of Figure 1 after coupling illustrating the use of the external visual indicia;

Figure 3 is an enlarged side elevation, partially cross-sectional view of the central portion of the connector assembly in the disengaged position;

Figure 3A is a cross-sectional view taken along lines 3A-3A of Figure 3;

Figure 4 is an enlarged, partially cross-sectional view similar to Figure 3 of the central portion of the connector assembly in the engaged position;

Figure 4A is a cross-sectional view taken along lines 4A-4A in Figure 4;

Figure 5 is an enlarged, side view of the central portion of the connector assembly, shown in engaged position;

Figure 6 is a top plan view of the connector post shown in Figure 1;

Figure 7 is also a side elevational view of the connector post of Figure 6; and

Figure 8 is a left end elevational view of the connector post of Figure 7.

Detailed Description of the Invention

In Figure 1, the connector assembly is shown generally at 10. Substantially cylindrical first and second cable connectors 12 and 14 join lengths of electrical cable 16 and 16'. Both generally elongated connector bodies are comprised of connector blocks 48 and 50 of electrically conductive material such as brass which are substantially encased in insulating material 18. Protruding at one end from first cable connector 12 is a generally cylindrical, conductive connector post 20 having a free end 22 and a fixed end 24. The connector post is adapted to fit into generally cylindrical recess 26 at the coupling end 27 of second connector 14.

The connectors are coupled and engaged by a cam means shown at 28 in Figures 3 and 4. As best seen in Figures 6-8, connector post 20 is provided with an asymmetric annular groove 34 which correspondingly defines a substantially annular ridge 36 at the free end of the post. Ridge 36 includes a flat section 40 which is key to the camming mechanism. It also includes an inner cam surface 41 which interacts with wedge 38 which protrudes radially inwardly from the interior of re-

cess 26 so as to provide a "pull up" action between the connectors 12, 14. As may be seen in Figure 4, the resilient outer casings of the connectors will be compressed at the annular area of their contact 43. This is permitted because the connector blocks, one of which is shown at 48, are normally recessed from this outermost area of contact 43. The wedging action thus produced creates a high pressure contact area between the connectors, which in turn provides a connection having a very low electrical resistance. It also reduces the possibility of environmental contamination and increases the engaging frictional forces between the connectors. As shown in Figures 3 and 3A, after insertion of connector post 20 into recess 26, the flat section 40 is positioned adjacent wedge 38. In this disengaged position, the connectors may be quickly and easily uncoupled. In order to engage the connectors together after coupling, one of the connectors may be rotated 180° around the longitudinal axis of the connector assembly to yield the fully engaged structure shown in Figures 4 and 4A. In this engaged position, as Figure 4A illustrates, wedge 38 is positioned to be laterally juxtaposed with ridge 36 of the connector post and disengagement of the connectors without reverse rotation about the longitudinal axis is prevented.

At the same time, cam means 28 prevents inadvertent disengagement of connectors after coupling. Asymmetric annular groove 34 is dimensioned and positioned so as to prevent rotation of either connector through an angle of greater than about 180°. Thus, after 180° rotation into the engaged position, further rotation is inhibited and disengagement may only be accomplished by a 180° reverse rotation. This action gives the operator "feel" of engagement. After use, the connectors may be disengaged by, again, 180° rotation of one connector about the longitudinal axis. Connectors 18, 20 may be made of rubber or other electrically insulating material.

In a preferred embodiment and as best illustrated by Figures 6 and 8, connector post 20 is provided with a longitudinal groove 44 which extends through the post from face 46 to connector block 50. The groove is preferably asymmetric, as illustrated in Figure 8. This aspect of the invention provides a linear spring action in the connector post structure, and thus ensures a more secure fit, improved electrical contact between the two connectors, and reduced wear with prolonged use. Additional rotational resistance and greater "break away" torquest are also provided.

Figures 2 and 5 illustrate the use of optional external visual indicia with the present invention. First connector 12 may at its mating end be provided with two different symbols 30 and 32, shown here as a circle and a square, placed diametrically opposed positions on the connector. Likewise, second connector 14 is provided with corresponding symbols 30' and 32' (not shown). Thus, when the connectors are coupled but not fully engaged, a circle is adjacent a circle, as shown in Figure 2, and, on the diametrically opposed side of the connector, a square is adjacent a square. After locking, i.e. after 180° rotation of one connector with respect to the other, different symbols appear next to each other, as illustrated in Figure 5.

Claims

1. An electrical cable connector assembly, comprising first and second cable connectors (12,14), the first connector comprising a generally cylindrical, conductive connector post (20), the second connector comprising a conductive part (48) with a generally cylindrical recess (26) in which the connector post may be mated, characterised by cam means (36,38) on the post (26) and within the recess (26), whereby after coupling and relatively rotating the connectors (12,14), the cam means are operable to prevent removal of the post from the recess.

2. A connector assembly according to claim 1, characterised in that the cam means comprise a part-annular groove (34) in the post (20) defining a part-annular ridge (36) at the distant end of the post, and a wedge (38) in the recess (26) projecting radially inward, the absent portion of the part-annular ridge permitting insertion of the part in the recess to a position in which the wedge is in line with the groove, relative rotation of the connectors (12,14) then moving the wedge into the groove.

3. A connector assembly according to claim 2, characterised in that the flank (41) of the ridge (36) facing the groove follows a helical path such that the relative rotation draws the two connectors together.

4. A connector assembly according to claim 2 or 3, characterised in that the groove (34) is so formed as to limit the relative rotation to about 180°.

5. A connector assembly according to claims 1 to 4, characterised in that the part (20) is part of a first conductive block (50) and the said conductive part (48) is a second conductive block.

6. A connector assembly according to claim 5, characterised in that both conductive blocks (48,50) are embedded in insulating material (18).

7. A connector assembly according to claim 3 and claim 6, characterised in that the insulating material (18) is resilient and the drawing of the two connectors (12,14) compresses the insulating materials of the two connectors together.

8. A connector assembly according to claim 7, characterised in that the insulating material (18) of the two connectors abut around the whole circumference to provide a seal.

9. A connector assembly according to claims 1 to 8, characterised in that the part (20) is longitudinally slotted (44) to provide resilience whereby the part is gripped in the recess (26) when mated therein.

10. A connector assembly according to claim 8, characterised in that the slot (44) is offset from the axis of the part.

11. A connector assembly according to claims 1 to 10, characterised by indicia (30,32) on the first and second connectors (12,14) for visually indicating whether the connectors are in engaged or disengaged position.

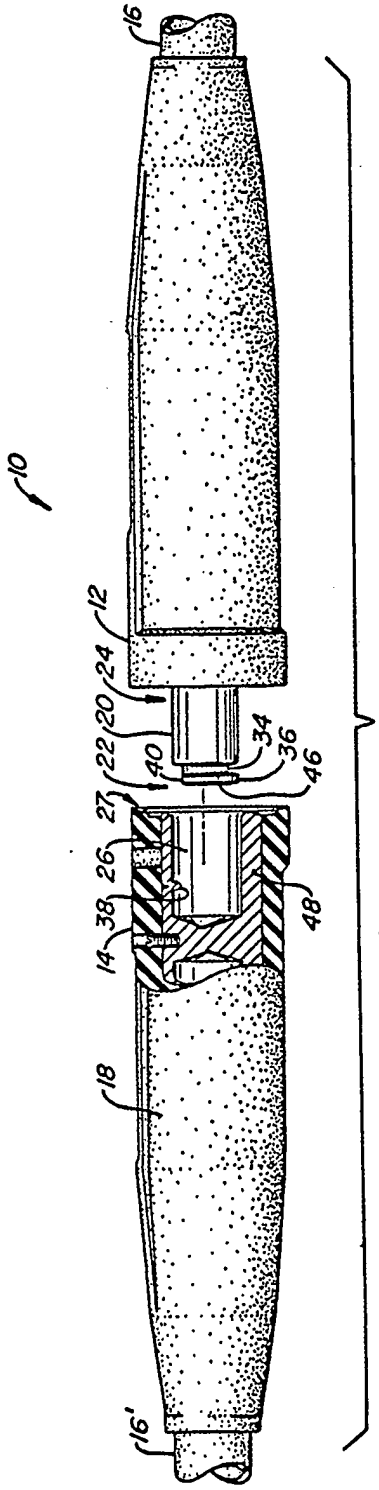

FIG._1.

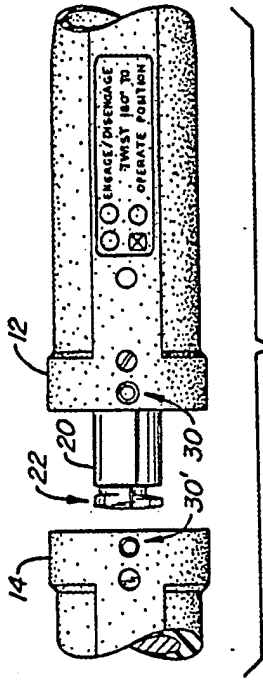

FIG._2.

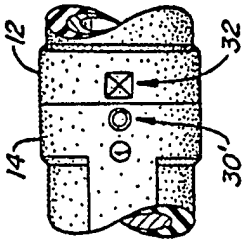

FIG._5.

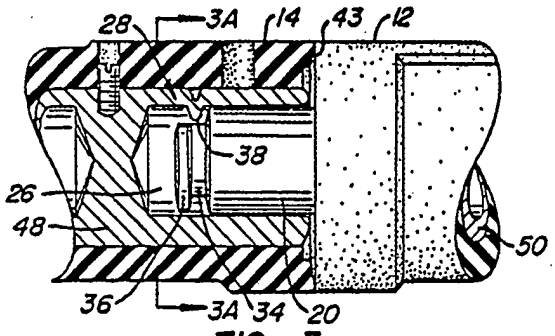

FIG._3.

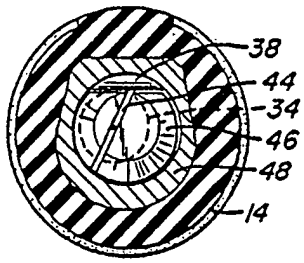

FIG._3A.

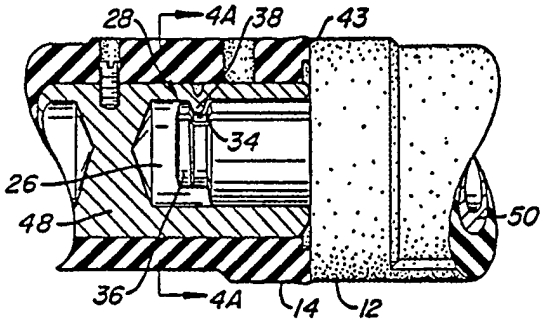

FIG._4.

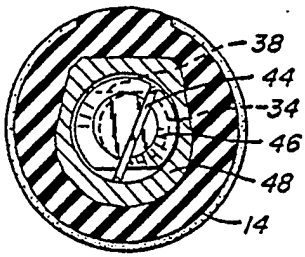

FIG._4A.

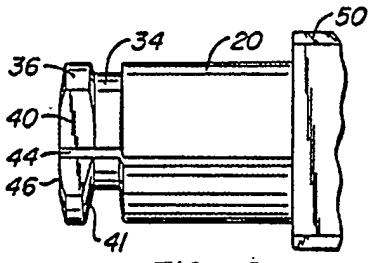

FIG._6.

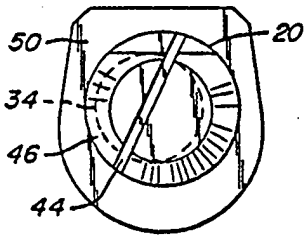

FIG._8.

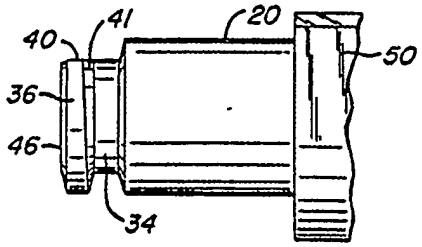

FIG._7.